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# The effect of drug and sexual risk behaviors with social network and non-network members on homeless youths' sexually transmissible infections and HIV testing

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## Abstract

**Background** – The study examined whether engaging in drug and sexual risk behaviors with social network and non-network members (strangers) differentially affected the decision to test for sexually transmissible infections (STIs) and HIV.

**Methods** – A cross-sectional survey was conducted among 249 homeless youths aged 14–21 years.

**Results** – Multivariate analyses revealed that females were over three times more likely than males to test for STIs (adjusted odds ratio (AOR) = 3.34; 95% confidence interval (CI) = 1.54–7.25). For every one unit increase in age, there was a 37% increase in the likelihood of having tested for STIs (AOR = 1.37; 95% CI = 1.12–1.68). Youths who had sex after using alcohol and drugs with strangers were approximately 3.5 times more likely to have tested for STIs (AOR = 3.45; 95% CI = 1.38–8.61). For every one unit increase in age, there was a 26% increase in the likelihood of having tested for HIV (AOR = 1.26; 95% CI = 1.05–1.51). Youths who had sex with a stranger after using alcohol or drugs were over three times more likely to test for HIV (AOR = 3.22; 95% CI = 1.42–7.31). No social network variables reached significance for STI or HIV testing.

**Conclusions** – Being older and engaging in drug and sexual risk behaviors with strangers are important correlates of STI and HIV testing. Females are more likely than males to be tested for STIs. Engaging in risky behaviors with social network members was not a key factor in deciding whether to be tested.

**Keywords:** adolescents, HIV, sexually transmissible infections, USA

## Introduction

It is estimated that as many as 2.8 million runaway and homeless youths live on the streets of America every day.<sup>1</sup> Their lifestyles and participation in drug and sexual risk behaviors, which they often engage in with social network members and other street individuals,<sup>2–4</sup> place them at significantly greater risk for contracting sexually transmissible infections (STIs and HIV) compared with the general adolescent population.<sup>5,6</sup> The prevalence of HIV in homeless youth, which has been as high as 12%,<sup>7</sup> may be as much as 2–10 times higher than that of other American adolescent samples.<sup>8</sup>

Numerous barriers to accessing services exist for homeless youths, such as confidentiality concerns, inability to afford services or lack of health insurance, mistrust and previous negative experiences with a staff member.<sup>9,10</sup> Despite these obstacles, many still access health-related services such as STI and HIV testing.<sup>11–13</sup> Youths who seek testing tend to be those who are at highest risk for contracting HIV.<sup>11,12</sup> Factors associated with STI testing include older age, amphetamine usage, and being a gay or bisexual male or heterosexual female.<sup>14</sup> Positive correlates of HIV testing include being

older, female, sexually active for more than 5 years, homeless for more than 1 year and having a history of an STI, using intravenous drugs, engaging in “survival sex,” and knowing someone with HIV.<sup>11,12</sup> As such, various substance use and sexual risk-taking have been associated with both STI and HIV testing.

Even though researchers have examined youth characteristics and behaviors that may be associated with STI or HIV testing, these studies do not include information on the people with whom homeless youths were engaging in these high-risk activities. As such, we do not know whether homeless youth are *less* likely to be tested for STIs or HIV if they are engaging in drug or sexual risk behaviors with a social network member versus a non-network member (i.e. a stranger). It is possible that because many of their network members tend to be similar to them and that they “know” them, homeless youths may be less likely to worry about the consequences of having sex with them and thus be less likely to be tested. In contrast, engaging in drug or sexual risk behaviors with a non-network member may prompt more homeless youths to be tested because they are unsure of the person's health status. Accordingly, the purpose of the current study is to use multivariate analyses to examine

whether homeless youths are less likely to be tested for STIs and HIV when participating in sexual and drug risk-taking behaviors with social network members versus non-network members. These findings may have implications for service provider intervention and prevention.

## Methods

### *Study sample*

Data are taken from the Social Network and Homeless Youth Project, a study designed to examine the effect of social network characteristics on homeless youths' HIV risk behaviors. A total of 249 homeless youths (137 females; 112 males) were interviewed in shelters and on the streets from January 2008 to March 2009 in three Midwestern cities in the USA. Selection criteria for this study required participants to meet the definition of runaway or homeless, and be between the ages of 14 and 21. A "runaway" refers to a youth under age 18 who has spent the previous night away from home without the permission of parents or guardians. "Homeless" included those who have spent the previous night with a stranger, in a shelter or public place, on the street, in a hotel room, staying with friends (e.g. couch surfing) or other places not intended as their resident domicile.

### *Data collection*

Experienced interviewers who had worked on past homeless youth projects, who had served for several years in agencies and shelters that support at-risk youth, and who were very familiar with local street cultures such as knowing where to locate youth and where they congregate conducted the interviews. All interviewers had completed the Collaborative Institutional Review Board (IRB) Training Initiative course for the protection of human subjects in research. Interviewers approached shelter residents and located other eligible respondents in areas of the cities where homeless youth congregate. They varied the times of the day on both weekdays and weekends that they went to these locations. This sampling protocol was conducted repeatedly over the course of 15 months. Prior to participation in the study, interviewers obtained informed consent from respondents and told youth that their responses would remain confidential and that their participation was voluntary. The interviews were typically conducted in shelter conference rooms or quiet corners of fast food restaurants if taking the youth back to the shelter was not feasible because of distance or safety concerns. The interview lasted ~45 min and all participants received \$25 for their involvement and \$5 for a meal. Youths were asked about their association and behaviors with network and non-network members.

Referrals for shelter, counselling services and food services were offered to youth at the time of the interview. The response rate was 97%. The IRB at the first author's institution approved this study.

### *Measures*

The two dependent variables included STI and HIV testing. STI testing was measured using two items regarding respondents' average and recent testing. Youths were asked

how frequently they were tested for STIs (response categories ranged from 0 = never to 5 = every day). This item was dichotomized so that 0 = never tested for STIs and 1 = tested at least a few times per year. For recent testing, respondents were asked when they were last tested for STIs (response categories ranged from 0 = never to 6 = 3 years ago or longer). This variable was dichotomized so that 0 = never and 1 = within the past week or longer. The two STI variables (i.e. frequency and how recent) were summed and then the final variable was dichotomized such that 0 = never tested for STIs and 1 = tested for STIs at least once. Respondents were also asked the same questions as above about how frequently and when they recently were tested for HIV. The same coding procedure was used, where the resulting variable was 0 = never tested for HIV and 1 = tested for HIV at least once.

Gender was coded as 0 = male and 1 = female, and sexual orientation was coded 0 = gay, lesbian, bisexual or transgendered (GLBT) and 1 = heterosexual. Respondents' age ranged from 14 to 21. Race was coded as 0 = non-white and 1 = white. Although all of the individual race categories (i.e. white, black, Hispanic, American Indian or Alaskan native, Asian, biracial and multiracial) were examined, none of them were significantly different from one another in terms of STI and HIV testing. Thus, for parsimony, a dichotomized race variable was used in all analyses.

"Any sexual victimization" was measured using five items about sexual abuse and sexual victimization experiences. For sexual abuse, respondents were asked if they were ever sexually abused as a child (under age 18). This dichotomous item was coded such that 0 = no and 1 = yes.

Respondents were also asked four items regarding sexual victimization experiences since leaving home such as whether they had been forced to do something sexual or been sexually assaulted or raped. Response categories ranged from 0 = never to 3 = many times. Each item was dichotomized (0 = never; 1 = at least once) and then summed with the sexual abuse item to create an index such that a higher score indicated more sexual victimization of any type.

### *Non-network member measures*

"Ever traded sex" was measured using two items. The first item asked respondents whether they had ever traded sex for food, shelter, money or drugs with non-network members. This dichotomous variable was coded as 0 = no and 1 = yes. The second item asked respondents whether any of their partners, not including those in their social network, ever made them do sexual favors for others in order to obtain money for drugs (coded as 0 = no and 1 = yes). These two items were summed and dichotomized because of skew so that 0 = never traded sex and 1 = traded sex at least once with a non-network member or stranger.

"One-time sexual partner" was a single item indicator that asked respondents if they ever had a one-time sexual partner, not including those in their social network. This dichotomous variable was coded as 0 = no and 1 = yes.

"No condom use" was a single item indicator which asked respondents if they had ever had sex without a condom in the past 6 months, not including those in their social network. This item was coded as 0 = no and 1 = yes.

"Sex after using substances" was measured using two items regarding a youth's sexual risk behavior with non-network members or strangers. Participants were asked if they had sex with a person after they had too much to drink and if they had sex with a person after using drugs. Response categories for both of these items were 0 = no and 1 = yes. The two items were summed and then dichotomized so that 0 = did not have sex after using alcohol or drugs, and 1 = had sex with at least one person while under the influence of alcohol or drugs.

### *Network member measures*

In order to learn about their social networks, youths in the study were asked to give the initials of up to five people that they see a lot or spend most of their time with now. They were also asked to provide the initials of up to three people they had sex with in the past 6 months. The individuals listed as sex partners could be the same people youth previously listed as spending a lot of their time with or could be new people not currently on their list. Youth could list up to eight social network members.

"Average sexual risk with network member" was created using eight different items regarding sexual risk behaviors between the respondent and each of their network members. Respondents were asked if they had ever had vaginal or anal sex with each network member (0 = no; 1 = yes). Those who answered affirmatively were then asked whether they had ever had vaginal or anal sex with the network member without a condom (0 = no; 1 = yes). Respondents were also asked the following four questions about each network member: (1) if the network member had ever been forced to have sex, (2) if the network member had ever had sex after having too much to drink, (3) if the network member had ever had sex after using drugs, and (4) if the network member had ever had sex to get money, drugs or a place to stay. The response categories for each of these items was 0 = no and 1 = yes. The eight individual items for each network member were first summed and then averaged across all network members with higher values indicating higher sexual risk behavior (potential range = 0 to 8).

"Average drug use with network member" was measured by asking respondents four questions about their substance use with each of their network members, including if they had ever gotten drunk with or used drugs with each network member, and if they had ever injected drugs with each network member (0 = no; 1 = yes). Those who responded affirmatively to this last question were then asked if they had ever used the same needle as that network member to inject drugs such as heroin, cocaine or speedball (0 = no; 1 = yes). These four items were first summed for each network member and then averaged across all network members with higher values indicating higher substance use risk (potential range = 0–8).

### *Data analyses*

Bivariate associations between ever having been tested for STIs and HIV, and dichotomous correlates were assessed by contingency table analysis. Prevalence ratios, their 95% confidence intervals (CIs), and their respective *P*-values were

calculated. Student's *t*-tests were used to assess bivariate associations between ever having been tested for STIs and HIV and continuous correlates. The logistic regression models were used to calculate adjusted odds ratios (AOR), their 95% CIs, and corresponding *P*-values. Significance was defined with an  $\alpha$  of less than 0.05.

## **Results**

### *Characteristics of the sample*

The sample included 137 females (55%) and 112 males (45%). Of these, 44 respondents (17.7%) self-identified as GLBT. The age of the sample ranged from 14 to 21 years, with a mean of 18.53 years. The majority of the sample was white (49.4%), with the remaining respondents self-identifying as black (23.7%), Hispanic (8%), American Indian or Alaskan native (4.8%), Asian (1.2%), biracial (8.8%) and multiracial (4%). Fifty-five percent of the sample had experienced some type of sexual victimization. Approximately 14% of the youths reported ever trading sex and 63% said they had sex with a one-time partner, not including those in their social network. Twenty-two percent of participants said they had sex without using a condom in the past 6 months, and 53% reported having sex while under the influence of alcohol or drugs with someone other than a network member. Average sexual risk behaviors that respondents engage in with their social network members ranged from 0 to 3.75. This indicates that, on average, youths have participated in almost four sexual risk behaviors with the people in their network. The average number of drug use behaviors that the respondent engaged in with a social network member ranged from 0 to 2.5. Thus, on average, youth have participated in at least two types of drug use behaviors with people in their network. Finally, 72% of youth reported ever being tested for STIs and 67% had been tested for HIV.

### *Bivariate associations*

Table 1 displays bivariate associations between the dichotomous correlates and ever having been tested for STIs and HIV. As shown in column one, females and GLBT youth were significantly more likely to have been tested for STIs compared with males and heterosexuals, respectively. In terms of behaviors with non-network members or strangers, those who had ever traded sex, had a one-time sex partner, had sex without a condom, and had sex after using alcohol or drugs were significantly more likely to have been tested for STIs. As shown in column two, the same four non-network variables were significantly associated with HIV testing, with the exception of having had sex without a condom. Gender and sexuality were non-significant; there were no significant differences in HIV testing between males and females, and between heterosexuals and GLBT youth.

Table 2 displays bivariate associations between continuous correlates and ever having been tested for STIs and HIV. As shown, older homeless individuals, those who have experienced any type of sexual abuse or sexual victimization, and those with higher average scores on both sexual and drug risk behaviors with social network members were significantly more likely to have been tested for STIs and HIV.



**Table 1.** Bivariate associations between dichotomous correlates and ever being tested for a sexually transmissible infection (STI) and HIV ( $n = 249$ )

Correlate	STI testing				HIV testing			
	<i>n</i>	% tested	Prevalence ratio	95% confidence interval	<i>n</i>	% tested	Prevalence ratio	95% confidence interval
Gender								
Female	137	79.6	0.786	0.67–0.93**	137	70.8	0.870	0.73–1.04
Male	112	62.5			112	61.6		
Sexuality								
Gay, lesbian, bisexual or transgendered	44	86.4	1.256	1.08–1.46*	44	79.5	1.25	1.04–1.49
Heterosexual	205	68.8			205	63.9		
Race								
Non-white	126	69.0	0.923	0.79–1.08	126	63.5	0.908	0.76–1.08
White	123	74.8			123	69.9		
Trading sex <sup>1</sup>								
Not traded sex	214	68.2	0.725	0.64–0.82**	214	63.1	0.715	0.61–0.84**
Traded sex	34	94.1			34	88.2		
One-time sex partner <sup>1</sup>								
No	92	55.4	0.676	0.56–0.82**	92	50.0	0.650	0.52–0.81**
Yes	156	82.1			156	76.9		
Sex without condom <sup>1</sup>								
No	194	68.0	0.796	0.69–0.92*	194	63.4	0.811	0.68–0.97
Yes	55	85.5			55	78.2		
Sex after using substances <sup>1</sup>								
No	117	55.6	0.643	0.54–0.77**	117	50.4	0.622	0.51–0.76**
Yes	132	86.4			132	81.1		

<sup>1</sup> Engaged in these behaviors with non-network members or strangers.\*\* $P < 0.01$ ; \* $P < 0.05$ **Table 2.** Bivariate associations between continuous correlates and ever being tested for a sexually transmissible infection (STI) and HIV ( $n = 249$ )

Correlate	Mean value					
	STI testing			HIV testing		
	Not tested	Tested	<i>T</i>	Not tested	Tested	<i>T</i>
Age	17.66	18.88	–4.99**	17.81	18.90	–4.65**
Any sexual victimization	0.78	1.84	–4.32**	0.92	1.86	–4.05**
Average sexual risk <sup>1</sup>	0.55	1.05	–4.93**	0.61	1.07	–4.62**
Average drug use <sup>1</sup>	0.46	0.74	–3.26**	0.49	0.75	–3.11**

<sup>1</sup> Indicates behaviors with social network members.\*\* $P < 0.01$ ; \* $P < 0.05$ 

### Multivariate associations

Table 3 displays the significant multivariate associations. Although numerous variables were previously associated with STI and HIV testing, when the model was adjusted for the influence of all other variables, many of the prior significant variables became non-significant. In the first column, the results are presented for STI testing and revealed that females were over three times more likely to have been tested for STIs compared with males (AOR = 3.34; 95% CI = 1.54–7.25). For every one unit increase in age, there was a 37% increase in the likelihood of having been tested for STIs (AOR = 1.37; 95% CI = 1.12–1.68). Youths who had sex after using alcohol or drugs with nonnetwork members were approximately 3.5 times more likely to have been tested for STIs (AOR = 3.45; 95% CI = 1.38–8.61). Although average sexual risk behavior with a social network member was marginally

significant, we do not report the statistics here, given that the  $P$ -value was slightly above the chosen cut-off of less than 0.05.

In column two, the results for HIV testing are presented and revealed that for every one unit increase in age, there was a 26% increase in the likelihood of having been tested for HIV (AOR = 1.26; 95% CI = 1.05–1.51). Young people who had sex with a non-network member after using alcohol or drugs were over three times more likely to have been tested for HIV (AOR = 3.22; 95% CI = 1.42–7.31). None of the social network variables reached statistical significance.

### Moderating effects

Although females and GLBT youth were significantly more likely to have been tested for STIs compared with males and heterosexual youth at the bivariate level, a test for interactions revealed no significant differences based on gen-

**Table 3.** Adjusted odds ratios for correlates of ever having been tested for a sexually transmissible infection (STI) and HIV ( $n = 249$ ).

Correlate	STI testing		HIV testing	
	AOR	95% confidence interval	AOR	95% confidence interval
Demographics				
Gender (1 = female)	3.34	1.54–7.25**	1.84	0.92–3.71
Sexuality (1 = heterosexual)	0.87	0.30–2.54	0.89	0.36–2.22
Age	1.37	1.12–1.68**	1.26	1.05–1.51*
Race (1 = white)	0.97	0.49–1.95	0.88	0.47–1.64
Any sexual victimization	1.17	0.91–1.51	1.19	0.95–1.48
Behaviors with non-network members				
Trading sex	1.21	0.23–6.46	1.00	0.28–3.65
One time sex partner	1.62	0.76–3.46	1.57	0.79–3.15
Sex without condom	0.51	0.18–1.49	0.48	0.19–1.24
Sex after using substances	3.45	1.38–8.61**	3.22	1.42–7.31**
Behaviors with network members				
Average sexual risk	2.00	0.99–4.05	1.66	0.91–3.04
Average drug use risk	0.89	0.44–1.81	0.87	0.46–1.64

AOR, adjusted odds ratio – adjusted for the influence of all other variables in the model.

\*\* $P < 0.01$ ; \* $P < 0.05$

der or sexuality for either outcome. Because the bivariate associations revealed no significant differences between whites and non-whites in terms of STI and HIV testing, no additional interactions were tested.

## Discussion

This study examined whether engaging in drug and sexual risk behaviors with social network and non-network members differentially affected the decision to get tested for STIs and HIV among homeless youth in the Midwestern USA. The rate of STI and HIV testing found in the current study (i.e. 72% and 67%, respectively) is generally consistent with what others studies on homeless youth have found. For example, results from one study revealed that 70% of homeless youth had at least one STD test,<sup>14</sup> whereas the percentage of HIV testing has been found to range from 39% to 89%.<sup>12</sup>

Being older was significantly associated with being tested for both STIs and HIV, which is consistent with previous research.<sup>11,14</sup> One possible explanation for the higher rate of testing among older homeless youth is because they are more knowledgeable about how STIs and HIV are contracted, including their associations with high-risk behaviors.

Although numerous homeless young people participate in risky behaviors,<sup>2,3</sup> older homeless youth may be more likely to be tested because they are informed of the risks and may be more aware of health service locations. In contrast, younger homeless adolescents, by the very nature of their developmental stage, may be more likely to be risk takers and to believe that they are invincible when it comes to experimentation with substance use and sexual activity, and thus have lower concerns regarding potential negative outcomes.<sup>15</sup> As such, these factors may contribute to their lower rates of testing.<sup>11</sup>

Previous research has found gender to be significantly associated with STI testing,<sup>14</sup> which is in accordance with findings from the current study. Because homeless females are

more likely to be tested, it seems plausible that they would have higher rates of STIs compared with their male counterparts, which is what previous research has found.<sup>16</sup>

Additionally, females may be more likely to be tested because of their higher risk of contracting STIs, given that they often engage in sexual intercourse with older males,<sup>17</sup> who are likely to have had more lifetime sexual partners and thus are a greater risk. Additionally, women may have less control when it comes to condom usage during sexual interactions,<sup>18</sup> which further contributes to STI and HIV transmission concerns. Finally, it is probable that females are more likely to be tested because they are often twice as likely to use medical services compared with males, often due to their gynaecological needs,<sup>19</sup> and thus when they have an STI, it is more likely to be detected.

In terms of HIV testing, males and females did not significantly differ in their likelihood of being tested, which is consistent with previous research.<sup>12</sup> It is possible that homeless males and females may be equally likely to be tested because both groups are aware of the serious health consequences that may result. Because previous research has not examined the relationship between homeless youth and their partners, it is unknown whether these young people are *less* likely to be tested for STIs and HIV if they engage in drug and sexual risk behaviors with a social network member compared to a non-network member. The results from the current study indicate that when controlling for the influence of all other variables, homeless youth who engage in risky behaviors with a nonnetwork member are more likely to be tested for both STIs and HIV. One possible explanation is that because homeless youth “know” their network members, they may be less likely to worry about the consequences of engaging in high-risk behaviors with these individuals. Additionally, many homeless youth may view their social network members as being similar to themselves<sup>20</sup> and therefore reason that these people must be safe, even though it is probable that they do not know their friends’ former and current health status. In contrast, engaging in drug or sexual risk behaviors with a non-network member significantly increased

the likelihood that homeless youth would be tested for STIs and HIV in the current study, perhaps because of their unfamiliarity with this person and their physical health status. Some literature, for example, has examined young adults' perceptions of HIV risk that may influence testing. Interacting with unfamiliar people in bars or other places where alcohol is served, which could lead to a one-night stand with a stranger, was associated with higher perceptions of HIV risk.<sup>21</sup> Thus, not knowing the person's sexual history may compel individuals to get tested.

Given that these homeless youth engage in sexual and drug risk behaviors such as trading sex and unprotected sex after substance use with both social network and non-network members, a holistic approach to intervention may be necessary to improve their well-being. This may be accomplished in several different ways. It is important to increase awareness of STIs and HIV among homeless youth through educational programs in shelters. Additionally, youth should be informed about the fact that engaging in risky sexual behaviors with anyone (even their friends) may place them at risk for negative health consequences. Homeless youth should also have access to sexual health counsellors in a non-judgmental setting. Programs aimed at improving homeless youths' self-efficacy and teaching them effective sexual negotiation skills, especially those targeted at condom usage, may reduce the rates of STIs and HIV. Service providers could also distribute free condoms and information pamphlets. Finally, increasing access and referrals to street health clinics are important intervention approaches.

### Limitations

Findings are limited in terms of generalizability due to the reliance on a convenience sample. Additional limitations include the use of cross-sectional data and self-reported measures. For practical and ethical reasons, however, self-reports may be the only feasible means of obtaining sensitive information,<sup>22</sup> especially from homeless persons. Although the reporting of HIV and STI testing may have been influenced by recall bias and social desirability, youths were asked about testing in two different ways within the survey and their responses were very similar. Furthermore, the present study focussed only on whether youths had been tested for STIs and HIV, and it is unlikely that the respondents would forget that they requested or experienced these procedures.

### Conclusions

Findings from this study suggest that having sex with a non-network member after using substances is a strong correlate of being tested for STIs and HIV. Females and older homeless youth are also more likely to be tested for STIs or HIV. Intervention efforts that target the individual and their social network members in non-judgmental settings and efforts that increase access and referrals are most beneficial for lowering the likelihood for participation in sexual and drug risk behaviors. These intervention efforts may ultimately decrease the probability of contracting STIs and HIV among this population of homeless young people.

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